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Reply to Harrison: The Representative Method

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Harrison's article eloquently articulates that the effects of speciation translate into how a given animal interacts with experimenter-arranged apparatus features. When features are set so that an animal's natural behavior on the first trials will enable it to emit the correct response, then acquisition can proceed very rapidly. In contrast, when features are set so that the animal's natural behavior on the first trials interferes with the correct response, then acquisition progresses only slowly. For example, when a novel auditory discriminative stimulus sounds from a location adjacent to the response manipulandum, acquisition is fast because the subject initially moves to the vicinity of the sound source and therefore is likely to engage the response manipulandum (Neill & Harrison, 1987). But acquisition is slow when the response manipulandum and the sound source are nonadjacent because the subject still moves to the sound source and therefore is less likely to engage the response manipulandum. Henton and Iversen (1978) presented a related response-pattern analysis of acquisition using visual stimuli.

Harrison suggests that slow discrimination acquisition in certain experiments may reflect arbitrary experimenter-arranged features. Thus, "acquisition data obtained from such experiments are the result mainly of forcing the species-specific behavior to fit the experimenter-designated behavioral interactions with the experimental environment" (Harrison, this issue, p. 217). On the surface, Harrison's argument appears to be similar to earlier critiques of operant conditioning research for the use of arbitrary responses and stimuli (e.g., Seligman, 1970; Shettleworth, 1979). However, the similarity is apparent and not real. According to Harrison, the basis for the conclusion that certain animals may be contraprepared to learn certain discriminations may be founded on generalizations from arbitrary features of the experimental environment (Neill & Harrison, 1987).

At issue is the so-called "quality-location effect" (Burdick, 1979). Konorski and his colleagues have demonstrated, using dogs as subjects, that sound location discrimination and sound quality discrimination depend on the training tasks (e.g., Konorski, 1967; Lawicka, 1964). That is, when they used a go/no-go procedure, sound quality discrimination (e.g., tone vs. noise) was acquired faster than sound location discrimination (e.g., the same stimulus at two different locations). On the other hand, when a go-left/go-right procedure was used, sound location discrimination was acquired faster than sound quality discrimination. Thus, the same stimuli controlled differently, depending on the particular training task. The findings of Konorski's group were of interest to proponents of the view that learning is constrained by an animal's natural preparedness for the task (e.g., Seligman, 1970; Shettleworth, 1979). For example, Seligman summarized the findings of the work by Konorski and his colleagues as follows:

> Dogs, then, are contraprepared for learning about different locations controlling a go-no go differentiation although they are not contraprepared for learning that the same locations control a left-right differentiation. Dogs are contraprepared for learning that qualitative differences of tone from the same location control a left-right differentiation, but not contraprepared for using this difference to govern a go-no go differentiation. (p. 413)

One of the critiques directed against the methods of operant conditioning was that experimenters had not taken into consideration natural, preexisting relations among experimenter-selected stim-

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uli, responses, and reinforcers. Thus, laws of learning based on arbitrary stimuli and responses were considered lacking in generality (Seligman, 1970).

Harrison's analysis is therefore particularly interesting because it shows that when one carefully examines the role of natural behavior in auditory discrimination experiments, the quality-location effect loses generality. In essence, the results show that subjects are *not* contraprepared for learning certain discriminations. Rather, the apparent training difficulties stem from interactions between trained behavior and natural behavior that were not previously examined. The experiments by Neill and Harrison (1987) provide a particularly compelling demonstration of the issue. Using rats as subjects, Neill and Harrison showed that location discrimination (i.e., S+ and S− are identical but sound from different spatial locations) is readily acquired with a go/no-go task when S+ is adjacent to the response manipulandum and S− is remote. However, location discrimination is not acquired at all with a go/no-go task when the same stimuli are presented at two different locations that are both remote from the response manipulandum. The critical variable is the location of the stimuli with respect to the response manipulandum. Harrison argues that this variable is important because in natural environments, the location of a sounding object is perfectly correlated with the response of manipulating the object (e.g., an insect buzzes, the rat approaches the source of the sound, and then appetitively manipulates the source). Thus, laboratory situations may fail to demonstrate control by stimulus location when none of the sounding stimuli are adjacent to the response manipulandum. Neill and Harrison showed that in all cases, the subject's natural (untrained) reaction initially was to move to the location of the sound. This activity competes directly with responding to the manipulandum when it is dissociated from the sound. Hence, the location discrimination is acquired slowly if at all.

Harrison's experiments thus suggest that the causes of repeated failures of auditory discrimination may more fruitfully be sought in the particular conditions of the experiments rather than in unspecified evolutionary constraints on learning. The constraints-on-learning view stated that certain organisms are biologically unprepared to learn certain auditory discriminations and criticized the methodology of operant conditioning for not considering a subject's naturalistic behavior tendencies. One cannot help noticing a bit of irony in the fact that the constraints-on-learning view proved to be of limited use with respect to auditory discriminations, precisely because it was based on accepting arbitrary experimental conditions as generally representative methodology.

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